

APPENDIX 1

Clotted CBC Action Plan

August 17, 2012

Yesterday Sybil, Bev and I had a 1 hour meeting regarding our concerns.

The facts are:

	NICU	IMCN
May	31	12
June	23	18
July	63	31
August	13	17

65% of the clotting occurs on the night shift in NICU; the majority of blood work is done on the night shift-TPN work ups

Plan we all agreed to is:

- Lab will investigate the tubes (The Neonatology leadership team feels that the staffs are drawing blood competently.)

As requested by the lab, Leadership team will review the process with staff:

- **"Tap and Flick"** with every drop that is drawn in the CBC container
- **The lab would like us to discontinue using Vaseline.** We will give that a try. (The lab will review it's communication of practice changes as we did not receive that direction)
- **We will change the order of draw, when drawing from a line.** We will no longer draw the blood gas first, then other blood work. They want us to draw the CBC first and immediately place into the CBC tube. Draw the blood gas and all other blood work second.
- **Invert the CBC tube slowly 8 times**
- **BD in service** has offered to come again and offer a refresher to the staff. The team will take them up on that offer
- The lab emphasized that it does not matter how quickly we get the sample to the lab. **A well-mixed sample will not clot** upon sitting. It can take up to 4 hours to inform the ward that a sample is clotted. When a sample is clotted, they take the sample out and try to manually process the sample.
- **Do not place a stick in the sample** to test if it is clotted.
- Approximately, 16 months ago we had clotting issues. At that time the lab asked us to emphasize **not using the first drop** of the poke for a CBC as it contains excess tissue fluid and most anti-coagulant.

Clotted CBC is frustrating for the whole team. Thank you every one who filled out a safety event form. Continue to document in detail on the form the process you did when drawing the blood. If staffing is possible, NICU would like to have 1 person draw the CBC for the shift. Thank you to Susan who performed the CBC blood work last night.

APPENDIX 2

November 2012 Blood Collection Action Plan

Thank you to the 5 staff members from NICU and the 4 staff members from IMCN who allowed their practice to be observed in order to improve the care to our infants. Thank you to Bev Ryner, Aaron Chui, and Janet Karr who helped arrange blood work to be drawn at 8 am on Friday, November 16, 2012, instead of the usual 4 am. Susan Csatari, RN Clinical Practice Consultant, Vascular Access Blood Collection- BD Diagnostics, spent the day in both units to observe our practice in the effort to improve our blood collection methods to help us provide safe nursing care to our infants. Enclosed are her observations.

Month	Clotted Samples			Clotted Samples		
	CS4 (NICU)			WT1 (IMCN)		
Month	# samples drawn	# samples clotted	% samples clotted	# samples drawn	# samples clotted	% samples clotted
Aug-12	161	18	11%	101	29	29%
Sep-12	145	24	17%	105	33	31%
Oct-12	108	16	15%	69	17	25%

The Units' plan to improve our practice is:

- 1) We are ordering the Quickheel Lancet (2 sizes- Quickheel light green and preemie Quickheel lancets) for blood work for higher blood flow needs and the Safe T Pro (purple) for blood glucose testing when you need only one drop for the glucometer.
- 2) Jennifer Prichodko, BD representative will provide in-services on blood collection and specifically the new Quickheel Lancet. In-services for both NICU and IMCN are:
 - Monday, November 26 at 9am
 - Thursday, November 29 at 13:00 and 20:30
- 3) Sybil has requested that the Quality department help NICU/IMCN and the lab evaluate their practices together.

She highlights a few areas where NICU/IMCN need to "Tune-up" our bedside blood collection practices:

- 1) **Alcohol needs to "air dry" before poking.** Residual alcohol can cause rapid hemolysis.
- 2) **Do not remove the tube away during collection or preform a modified "tap and flick approach."** This is a significant change in practice for us. Place the tube behind the drop and do not move it. Drops of blood should be allowed to flow freely into the collector top and down the walls of the tube. If a drop of blood becomes lodged inside the collector top, a gentle tap of the tube on a hard surface is sufficient to move it to the bottom of the tube. **Note that the "gentle tap" is only to move a drop of blood which may be stuck inside the lip of the tube. Re: anticoagulated specimen: all lavender MAP tubes contain EDTA, an anticoagulant.**
- 3) **Don't "scoop" the blood!** Using a scooping motion along the surface of the skin to collect blood can result in platelet activation, tissue-fluid contamination and hemolysis
- 4) **Mixing the completed blood work. One Inversion180° down and up again.** "The up again" is a change from what we were taught 2 years ago. The purple CBC tube is to be inverted 8 times and the green lytes tubes 10 times. This information on number of inversions needed is on the laminated poster at the desk. All the blood work in the mico tubes needs a certain number of inversions. (The number of times you invert is faintly printed on the CBC tube)
- 5) **Wipe away first drop of blood** The first drop is most likely to contain excess tissue fluid, resulting in dilution of the sample, and platelet plug formation
- 6) **Gentle, intermittent pressure on heel to allow capillary bed to fill between drops.** Strong, repetitive pressure (milking) must not be applied; it may cause hemolysis and tissue fluid contamination of the specimen

Syringe draws from a line tricks (I learned a few things in this presentation)

- Loosen plunger in barrel by moving up and down several times, prior to collection (This was new to me)
- Keep blood in contact with bottom of plunger at all times
- Slow, intermittent draw, allowing line to fill between pulls
- **Gentle and steady** draw to avoid damage to blood cells
- Smaller syringes exert less negative pressure¹
- Immediate transfer to tube and mixing essential to avoid excessive clotting

APPENDIX 3

December 11, 2012 Blood Work Concerns Update

A meeting is being arranged with Quality, lab, NICU, and IMCN. We are doing to review and share all the steps of the processes for blood sampling, sending, receiving and analyzing in December or January. Thank you to everyone for your making the practice improvements needed for blood work collection

Month	CS4 (NICU)			WT1 (IMCN)		
	# samples drawn	# samples clotted	% samples clotted	# samples drawn	# samples clotted	% samples clotted
May-12	158	33	21%	64	12	19%
Jun-12	106	23	22%	70	18	26%
Jul-12	149	63	42%	67	31	46%
Aug-12	161	18	11%	101	29	29%
Sep-12	145	24	17%	105	33	31%
Oct-12	108	16	15%	69	17	25%
Nov-12	115	27	23%	66	17	26%

July 1, 2012- Lab discontinued their blood collection to IMCN. IMCN staff performing heel poke blood work for their patients.

Of the clotted samples in November NICU had 8 patients with clotted samples twice in the same day; IMCN had 3 patients with clotted samples twice in the same day.

Thank you to the HSC lab .They has agreed to provide weekly stats.

BD Education for both NICU/IMCN occurred November 16-days, November 26-days, November 29 -day and evening, and Dec. 10 days.

NICU started using the Quikheel Lancet on December 2

Month	CNIC			WT1 (IMCN)		
	# samples drawn	# samples clotted	% samples clotted	# samples drawn	# samples clotted	% samples clotted
Nov 1 - 3	20	6	30%	5	1	20%
Nov 4 - 10	27	5	19%	20	5	25%
Nov 11 - 17	27	6	22%	16	4	25%
Nov 18 - 24	21	6	29%	10	4	40%
Nov 25 - 30	20	4	20%	15	3	20%
Dec 2 - 8	20	1	5%	16	7	44%

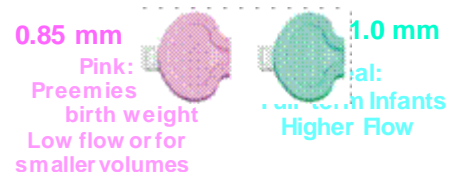
Here is BD's step by step for drawing blood via a heel poke

For consistency to allow maximum healing time between pokes, Let's start the practice of doing the first poke on the top outside of the foot(in the safe areas).

Place all future pokes counter clock wise around the foot. Hopefully the first site is healed before we need to poke it again.

BD Quickheel Lancet

- Select site:
 - Do not use previously punctured sites
 - Medial or lateral site
- Allow alcohol to dry (Residual alcohol can cause hemolysis and can have adverse effects on results)
- Place the blade slot area securely against the heel at a 90 degree angle to the length of the foot
 - Allows for multiple incisions at site
 - Cuts across capillary bed for better blood flow
- Hold lancet in place for 2 seconds after button pushed to allow full sweep of blade
- Wipe away first drop of blood (The first drop is most likely to contain excess tissue fluid, resulting in dilution of the sample, and platelet plug formation (will cause clotting))
- Gentle, intermittent pressure on heel to allow capillary bed to fill between drops (strong, repetitive pressure ("milking") must not be applied; it may cause hemolysis and tissue fluid contamination of the specimen)
- The blood flow can be increased by gently placing pressure on either side of the tiny cut. This opens the incision, allowing for a free flow of blood.
 - Squeeze ends of incision; aim is to open it up, not close edges together (think of squeezing the ends of a change purse to open it)
- Don't "scoop" the blood! (Can result in platelet activation, tissue-fluid contamination and hemolysis)
 - Use the lip of the tube as a guide for the blood; lip and inside of tube coated with silicone to help direct blood flow downward
- After wiping away first drop, allow a good size second drop to form before touching tube to drop of blood
 - Hold tube lip at 45° angle gently against skin, under blood drop; maintain this contact throughout collection
 - First drops create a pathway, or channel, for subsequent flow
- Do not remove tube to "tap and flick"; gentle tap only if drop stuck on lip of tube
- Immediate mixing is key to avoid clotted specimens (Green and Lavender tubes: 8-10x)



APPENDIX 4

February 13, 2013 Blood Work Update

Sybil, Judy, and I attended a meeting organized by Shelley Probizanski, manager of Patient Safety, Quality & Risk Manager with HSC's lab supervisors. We discussed our concerns and frustrations with our inability to provide our high standard of patient. We discussed the work that IMCN/NICU staff have completed in order to improve our blood collection practices

There currently are no stats kept by HSC on their clotting rates. The lab has agreed to keep track of our rates so we can track it. The lab has no ability to record where the sample can from. We have a "feeling" but no facts. Many of our staff believe that samples in the past that did not clot are now clotting (venipunctures and blood from indwelling lines) Now, we must create stats.

Thank you to Nursing and Nursing support staff for filling out the numerous "Safety Event records" (formally called occurrence reports) Please continue.

Addressograph the report. Please list the following information:

- Time that the blood work sent.
- Lab ID number
- Time lab called
- Time bedside nurse notified

We now need to add a sticker to all Safety event records when a clotted blood occurs in order to create stats to validate our "feeling". This will help our units provide quality control. Shelley Probizanski is contacting DMS quality. She created the check box which will enable HSC Quality to provide us with stats that we require.

- Heel poke
- Peripheral venipuncture
- Central line:
 - Peripheral arterial line
 - UAC

Dr. Molly Seshia/Debbie Fraser have agreed to contact Canadian Neonatal Network, to see if other centers are having issues.

We have made progress in this issue. We will continue to look for solutions to help provide quality care to our population.

FIGURE 1

